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(54) Abstract Title
Electricity supply meter with an ancillary module

(57) An electricity meter 52 comprises an ancillary module 50 which electrically interconnects with the meter such that the module 50 derives power from the meter 52 and/or information is passed between the meter 52 and the module 50. The module 50 may comprise pre-programmed tariff switching means or a modem arrangement for transmitting or receiving information via a telephone network. The module 50 may obtain its power for operation from the meter 52, a battery or from a telephone network via a modem arrangement. The module 20 may include an extension 22 with sprung contacts 24 which enables the module to interconnect with the terminals or terminal screws of the meter by simply replacing the meter's terminal cover by the module extension 22.

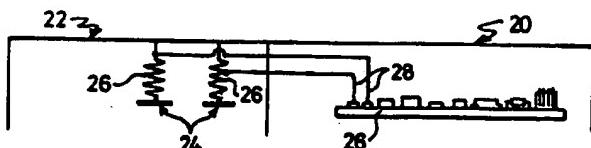


Fig. 5

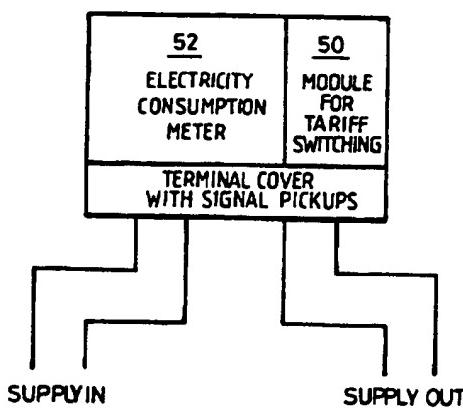


Fig. 7

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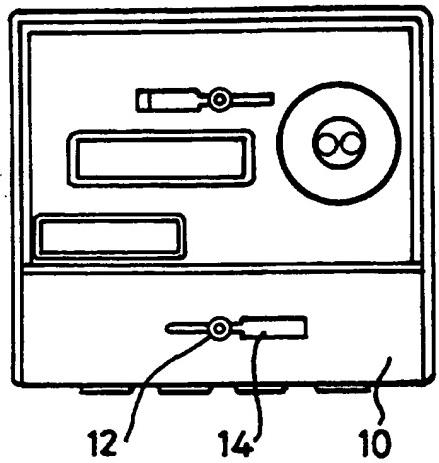


Fig. 1a

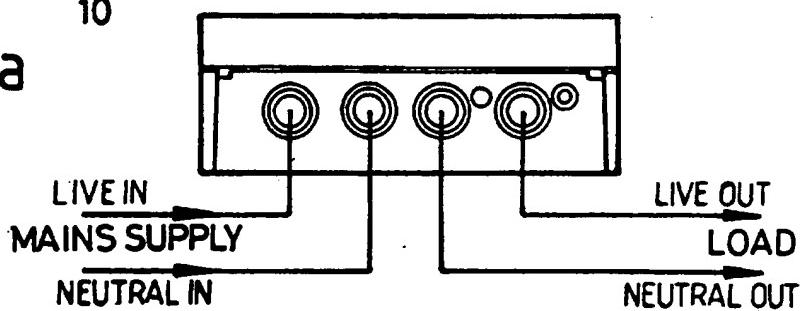


Fig. 1b

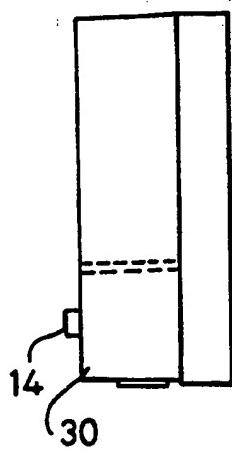


Fig. 1c

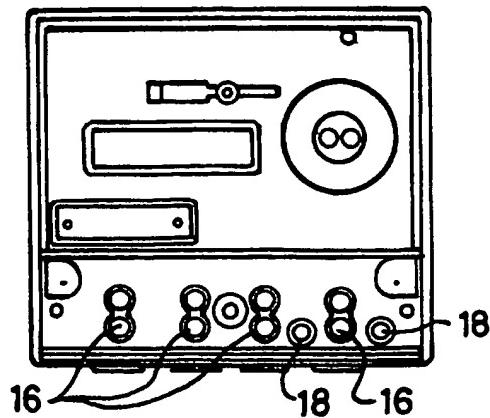


Fig. 2

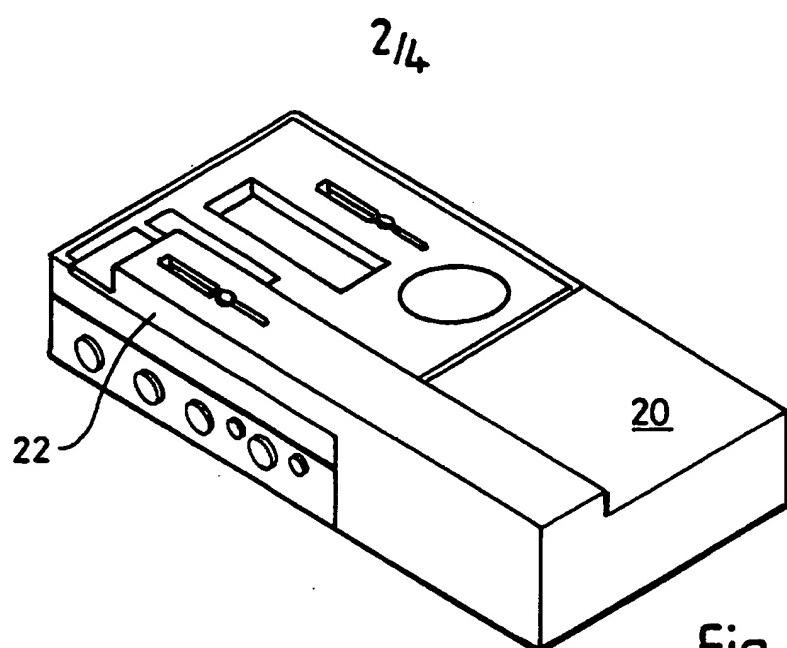


Fig. 3a

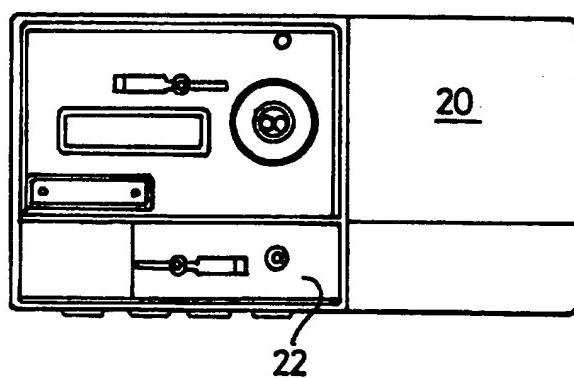


Fig. 3b

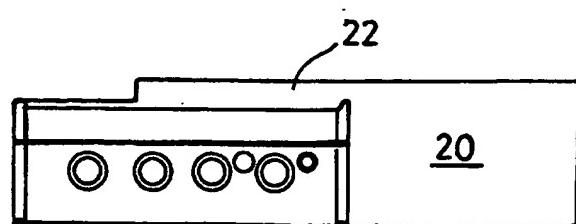


Fig. 3c

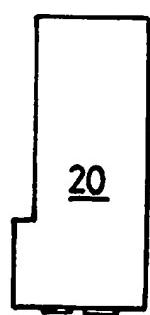


Fig. 3d

$3\frac{1}{4}$

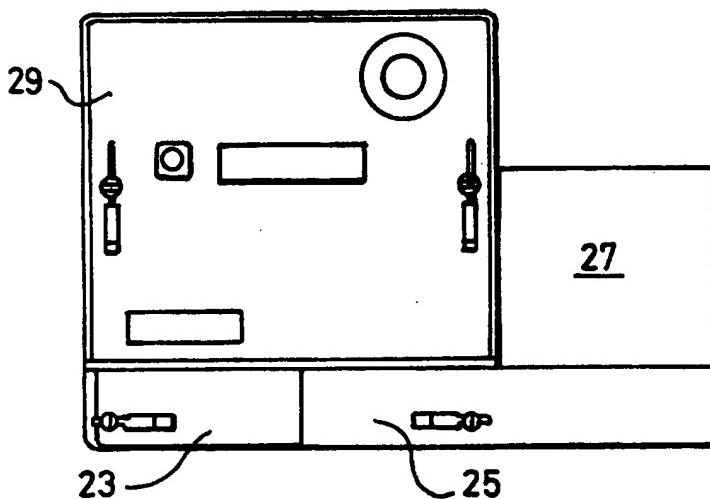


Fig. 4a

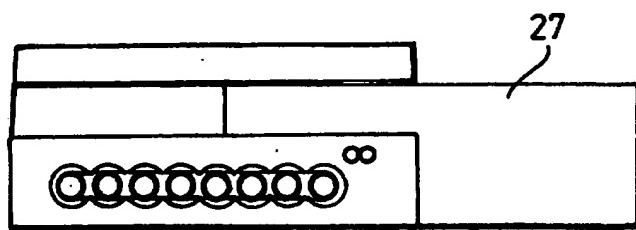


Fig. 4b

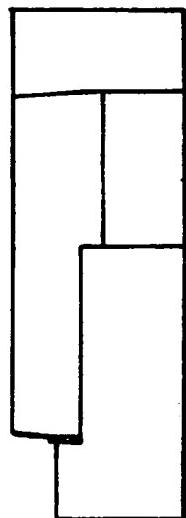


Fig. 4c

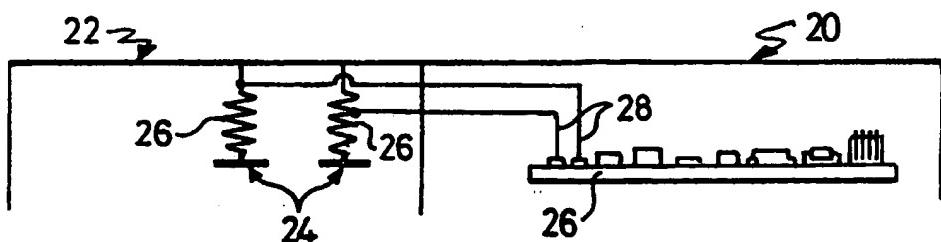


Fig. 5

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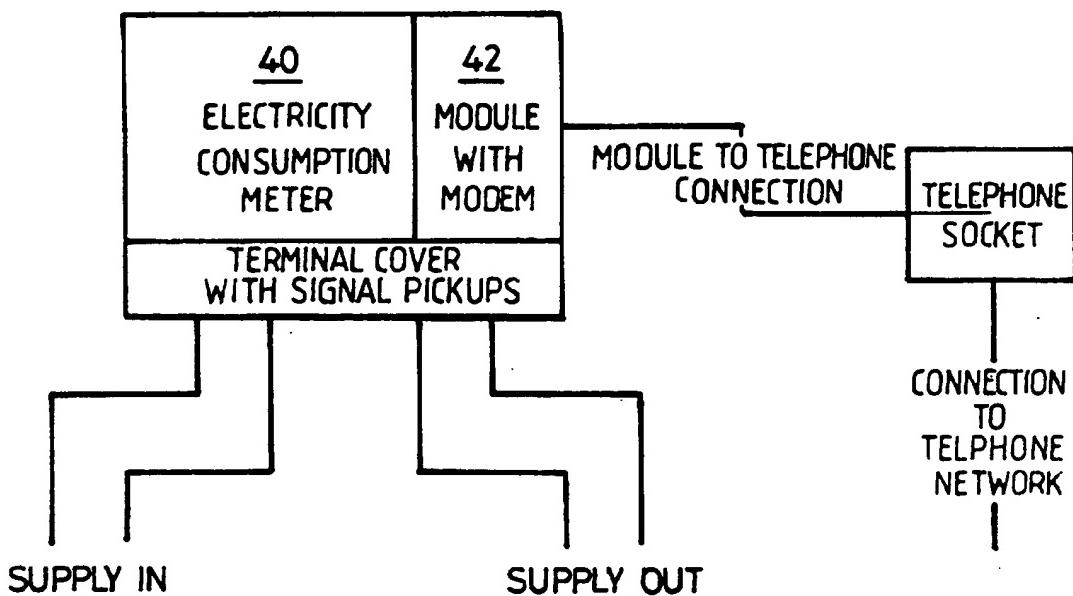


Fig. 6

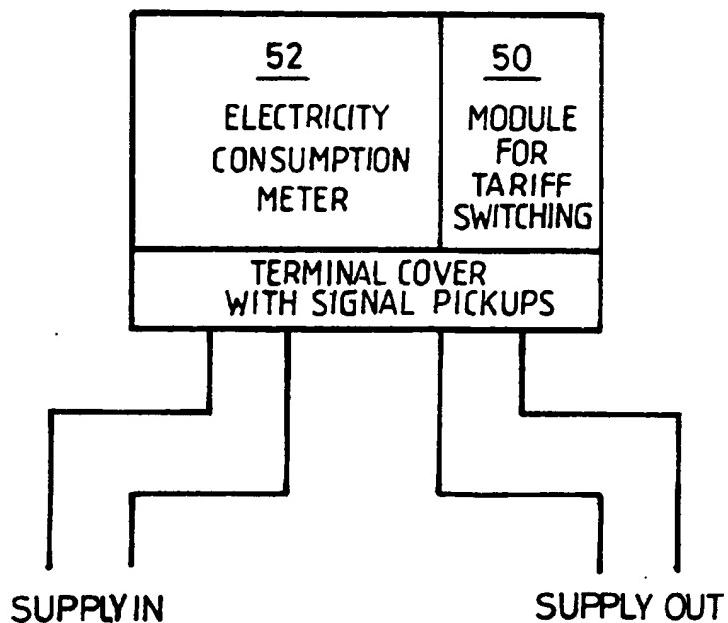


Fig. 7

Title: Electricity Supply MetersField of the invention

This invention concerns electricity supply meters and auxiliary equipment modules for use therewith.

Background to the invention

It is often required to connect ancillary equipment to an electricity meter, e.g. for communication to or from the meter, to provide prepayment facilities, or to collect data from the meter.

Summary of the invention

According to the present invention, there is provided an electricity meter in combination with an ancillary equipment module, the meter and module being adapted for electrical interconnection so that the module can perform an ancillary function for which power is derived from the meter and/or information is passed between the meter and the module.

In one example, the module receives information from the meter and incorporates a modem for delivering such information to a control centre over the telephone network. In this case the module may derive power from the telephone network.

In another example, the module provides information to the meter for tariff switching. In this case the module may be battery powered.

It may be preferred, however, for the module to derive electrical power from the meter.

According to a further aspect of the invention, therefore, the electricity meter which is provided with a terminal cover which normally prevents unauthorised access to pairs of terminals to which incoming and outgoing pairs of cables are secured by retention screws and which also serves as a safety cover/barrier when in place, is used to power the ancillary equipment module by removing the terminal cover so that an extension of the ancillary equipment overlies the terminals and effects electrical contact between the ancillary equipment and one of the pairs of terminals or the cable retaining screws thereof.

To this end it has been proposed to provide a dedicated mains outlet (socket) integral with a meter: however this has drawbacks. Firstly a conventional meter has to be replaced by a specially designed meter with an integral socket, before an ancillary device can be fitted thereto, since existing meters do not include such sockets. Secondly the incorporation of a mains outlet significantly increases the cost of a meter. Thirdly the dedicated outlet socket also has to be made safe when not required, necessitating the use of extra covers and sealing means.

Although in its further aspect the invention requires the removal of the terminal cover so as to expose the mains inlet and outlet cables and terminals, when an ancillary equipment module is put in place alongside the meter, the extension thereof, which typically forms a side of the module, not only makes contact with two of the terminals or screws but also serves to cover the exposed terminals and screws to prevent accidental touching.

Typically connection is made to the neutral and live output terminals (or their screws) of the meter.

The invention, in its further aspect, provides electrical power for an ancillary equipment module when positioned alongside the

meter, without the need to provide a dedicated outlet-socket in the meter.

Preferably, the extension from the module is formed from electrically insulating material so that when in position it forms a cover for the meter terminals, cables and screws to prevent unauthorised or accidental access and thereby replaces the safety barrier provided by the original terminal cover.

Conductor means provides for the passage of electric current between the terminals/screws and electrical and electronic circuitry within the module.

Electrical contacts connected to the conductor means are formed from any suitable electrically conducting material and according to a preferred aspect of the invention are urged into contact with the terminals or the screw heads, by a sufficient force to ensure good electrical connection between terminals or screw heads and the contacts.

The force may be obtained from resilient spring means such as helical springs under compression or a sprung arm arrangement.

Not only can resilient spring loaded contacts be used to pick up electrical power from a meter, but signals can be conveyed to or from the meter when the terminal cover is removed and contact made. Such signals are for example pulses from the meter representing the energy consumed, time-switch information from the meter to control external equipment in or via the module, or time-switch information to control the meter from or via the module. These signals may be in the form of a modulation on the mains voltage or may be available at or have to be supplied to auxiliary terminals adjacent the power terminals. Therefore the invention also allows a module to be connected to a meter and to receive electrical signals available from the meter and/or to transmit signals to the meter when the meter terminal cover is removed and the

appropriate terminals are uncovered, as well as to connect the module either to the mains supply into the meter or to its metered power output.

Description of Embodiments

The invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figures 1a, 1b and 1c show a meter having a terminal cover, shown in place;

Figure 2 shows the meter with its terminal cover removed;

Figures 3a to 3d are different views of the meter with an ancillary equipment module in place;

Figures 4a to 4c are different views of such a module fitted to a 3 phase 4 wire meter;

Figure 5 shows the module and the lateral module extension;

Figure 6 shows another possible configuration of assembled electricity meter and auxiliary equipment module; and

Figure 7 shows a further possible configuration of the meter/module combination.

Referring to Figures 1a to 1c, the terminal cover 10 is held in place with a screw 12 which is sealed at 14 to prevent unauthorised access during normal use. Figure 1b also details the mains connections to and from the meter.

Removal of the cover 10 as in Figure 2 exposes the incoming mains cable retention screw heads 16 and auxiliary terminal connection screw heads 18.

As shown in Figures 3a to 3d, when a module 20 is in place next to the meter and the terminal cover 10 is removed, the module extension 22 provides a cover for the terminals. Electrical contacts for making electrical connection to the terminals or screws are housed within the extension 22.

In Figures 4a to 4c a secondary cover 23 is fitted over some of the terminals and cooperates with the module extension 25 to protect all the terminals when the module 27 is fitted to the 3 phase meter 29.

Figure 5 shows the interior of the module 20 and electronic circuitry 26. Inside 22 are contacts 24 acted on by helical springs 26. Wires 28 provide for electrical connection between the contacts 24 and the circuitry 26.

In operation, an unauthorised person would cut the seal 14, remove the screw 12 and the terminal cover 10 from the meter. The module 20 then would be placed next to the meter with its extension 22 overlying the terminals of the meter, so that the spring loaded contacts 24 within 22 will make electrical contact with screw heads 16 and 18 as required. Once fitted the extension 22 can be secured in place by replacing screws 12 to retain it instead of the terminal cover 10. The screw 12 can be resealed to prevent unauthorised access.

Figures 6 and 7 show other possible configurations of electricity meter and auxiliary equipment module.

Figure 6 shows the meter 40 in use with a telephone MODEM module 42 which derives its power from the telephone circuit. This module interfaces the meter with the telephone network. The module accepts metrology pulses from the meter. These pulses are proportional to the electricity consumed, e.g. 1000 pulses per kWh. The pulses are counted by the module to produce a number representative of the energy consumed. The data is then forwarded to the billing agency via the telephone

network.

A second use could be that the module could be used to provide time switch control signals to the meter for tariff switching of time dependent tariffs.

Figure 7 shows an example of a self powered module. The module 50 is battery powered such that it is exchangeable by the electricity company. The module connects to the meter 52 for the purpose of providing the switching control signals to the meter for time based tariff switching. The module is pre-programmed by the supply authority prior to installation. Should the authority wish to alter the time switching regime then they would pre-program a second unit which would then be exchanged for the original module.

It is within the compass of the invention to provide part of the operative power for the module from the meter, as heretofore described, and another part of the operative power from the telephone network or a battery on-board the module.

In the arrangements of Figures 6 and 7, the module can be provided with an extension, analogous to that described with reference to Figures 1 to 5, which provides automatic connection to meter terminals, not for power supply to the module, but for exchange of information between the meter and the module, and the extension can again replace the normal terminal cover of the meter. Automatic connection for communication of information signals between the meter and the module can be achieved in like manner to that described with particular reference to Figure 5.

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1. An electricity meter, in combination with an ancillary equipment module, the meter and module being adapted for electrical interconnection so that the module can perform an ancillary function for which power is derived from the meter and/or information is passed between the meter and the module.
2. The meter and module combination according to claim 1, wherein the module receives information from the meter and incorporates a modem for delivering such information to a control centre over the telephone network.
3. The combination according to claim 2, wherein the module derives power from the telephone network.
4. The combination according to claim 2 or claim 3, wherein the module receives power consumption information from the meter and the modem delivers such information to a billing agency over the telephone network.
5. The combination according to claim 1, wherein the module provides information to the meter for tariff switching.
6. The combination according to claim 5, wherein the module is pre-programmed for a specific tariff switching program and is exchangeable with an alternative module pre-programmed for a different tariff switching program.
7. The combination according to claim 5 or claim 6, wherein the module is battery powered.
8. The combination according to claim 1 or claim 2, wherein the module derives electrical power for its operation from the meter.

9. The combination according to claim 8, wherein the electricity meter, which is provided with a terminal cover which normally prevents unauthorised access to pairs of terminals to which incoming and outgoing pairs of cables are secured by retention screws and which also serves as a safety cover/barrier when in place, is used to power the ancillary equipment module by removing the terminal cover so that an extension of the ancillary equipment overlies the terminals and effects electrical contact between the ancillary equipment and one of the pairs of terminals or the cable retaining screws thereof.

10. The combination according to claim 9, wherein the extension of the ancillary equipment module not only makes contact with two of the terminals or screws but also serves to cover the exposed terminals and screws.

11. The combination according to claim 9 or claim 10, wherein connection is made to the neutral and live output terminals (or their screws) of the meter.

12. The combination according to claim 10 or claim 11 when appendant to claim 10, wherein the extension from the module is formed from electrically insulating material.

13. The combination according to any of claims 9 to 12, wherein conductor means provides for the passage of electric current between the terminals/screws and electrical and electronic circuitry within the module.

14. The combination according to claim 13, wherein electrical contacts connected to the conductor means are formed from electrically conducting material and are urged into contact with the terminals or the screw heads with a sufficient force to ensure good electrical connection between terminals or screw heads and the contacts.

15. The combination according to claim 14, wherein the required force may be obtained from resilient spring means such as helical springs under compression, or a sprung arm arrangement.

16. The combination according to claim 15, wherein the resilient spring loaded contacts are not only used to pick up electrical power from a meter but also signals conveyed to or from the meter when the terminal cover is removed and contact made.

17. The combination according to claim 16, wherein the signals are pulses from the meter representing the energy consumed or time-switch information from the meter to control external equipment in or via the module or time-switch information to control the meter from or via the module.

18. The combination according to claim 17, wherein the signals are in the form of a modulation on the mains voltage.

19. The combination according to claim 17, wherein the signals are available at or are supplied to auxiliary terminals adjacent the power terminals.

20. An electricity meter and module combination substantially as hereinbefore described with reference to the accompanying drawings.



The
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Application No: GB 9801698.3
Claims searched: 1 - 20

Examiner: J. A. Watt
Date of search: 3 June 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): G1U (UR1102, UR1104, UR1124, UR1156, UR21133)

Int Cl (Ed.6): G01R 11/02, 11/04, 11/24, 11/56, 21/133

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2300723 A (SIEMENS) see fig.1 and col.2, line 45 to col.3, line 10	1 at least
X	GB 2300719 A (SIEMENS) see figs.1 & 2 and page 1, line 1 to page 2, line 17	1 at least
X	GB 2295681 A (SIEMENS) see figs.1a - 2h and page 10, line 22 to page 11, line 17	1, 2 & 4 at least
X	GB 1204111 (LONDON ELECTRICITY) see figs.1 - 5 and page 2, lines 59 - 97	1 at least
X	EP 0538770 A1 (ZELLWEGER USTER) see whole document	1 at least
X	EP 0511482 A1 (LANDIS & GYR) see figs.1 - 6 and col.1, lines 1 - 12	1 at least
X	US 4963820 (ABB POWER T & D) see figs.1 - 3 and col.1, lines 5 - 24	1 at least

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